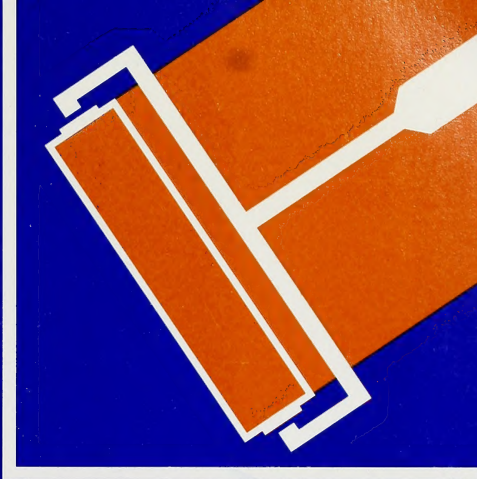


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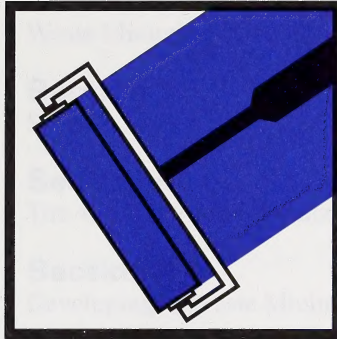
MANUAL

Paint Industry

MINIMIZATION

APR 23 1997

WASTE



MINIMIZATION

MANUAL

Paint Industry

Action
on WASTE



Alberta
ENVIRONMENTAL PROTECTION

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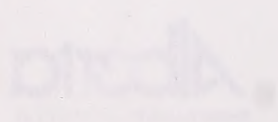
WASTE

MINIMIZATION



MANUAL

Paint Industry



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Acrylic
Other

TABLE OF CONTENTS

Section 1

About This Manual 1

Section 2

Waste Minimization Makes Good Business Sense 2

Section 3

Success Stories 3

Section 4

The 4Rs Of Waste Minimization 4

Section 5

Developing A Waste Minimization Program 5

Step 1: Build Interest 6

Step 2: Conduct A Waste Audit 7

Step 3: Develop A Waste Minimization Plan 8

Step 4: Implement Your Plan 9

Step 5: Monitor Progress 10

Section 6

Waste Minimization Options 11

Section 7

Keeping Up To Date 17

Section 8

Knowing The Rules 18

Section 9

How To Get More Information 19

Appendix A

Business Strategy Assessment For Waste Minimization 20

Appendix B

Paint Industry Waste Audit Table 23

Appendix C

Waste Minimization Option Evaluation Forms 30

Appendix D

Waste Minimization Program Review Checklist 32

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Purpose

This manual was developed by Alberta Environmental Protection to help paint manufacturing companies to develop waste minimization programs. Much of the information presented, however, is also useful to paint contractors interested in minimizing their waste. The manual provides useful information and waste minimization examples that will benefit company owners, operators and managers. The manual is part of a voluntary provincial program to help reduce waste going to landfill by 50 percent by the year 2000.

Who Should Read This Manual?

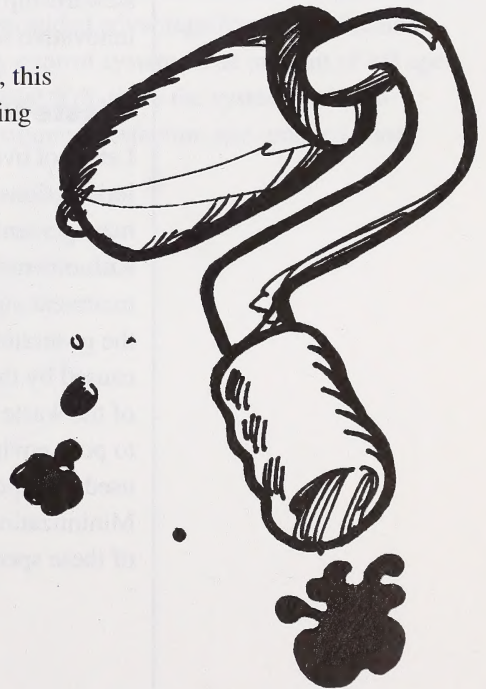
This manual provides waste minimization information that may be useful to a wide range of companies involved in the manufacture of paint related products including:

- Architectural coatings
- Industrial coatings
- Specialty coatings

This manual provides waste management and waste minimization information that is applicable to small, medium and large companies operating throughout Alberta.

How To Use This Manual

Intended to be a self-help document, this manual will allow paint manufacturing companies to identify, evaluate and implement waste minimization alternatives and develop a company waste minimization program.



WASTE MINIMIZATION MAKES GOOD BUSINESS SENSE

Waste Costs Money

Simply put, anything that leaves your shop that the customer pays for is a **product**; anything that leaves your shop that the company pays for is a **waste**. When considered from this perspective, it only makes sense to generate more product and produce less waste. Furthermore, it has become apparent that landfilling of waste is becoming a less desirable practice, particularly in centres where landfill space is at a premium. Prices to landfill wastes are steadily increasing and costs for disposal of hazardous wastes are prohibitive to many small businesses. While some businesses may pass on the additional costs for disposal to their customers, the most successful businesses will maintain a competitive edge in the marketplace by keeping their overhead costs down and not adjusting their prices.

Waste Minimization Can Improve Your Public Image

Although the economic factors cannot be over-stated, there are many other reasons to consider waste minimization in the paint manufacturing industry. Environmental concerns share the public spotlight with other key issues facing society. Commitment to environmental issues can often be used as a marketing tool for products and services. Companies that promote environmental stewardship benefit from high employee morale and a willingness to pursue innovative solutions to waste management problems.

Waste Minimization Can Reduce Your Liability

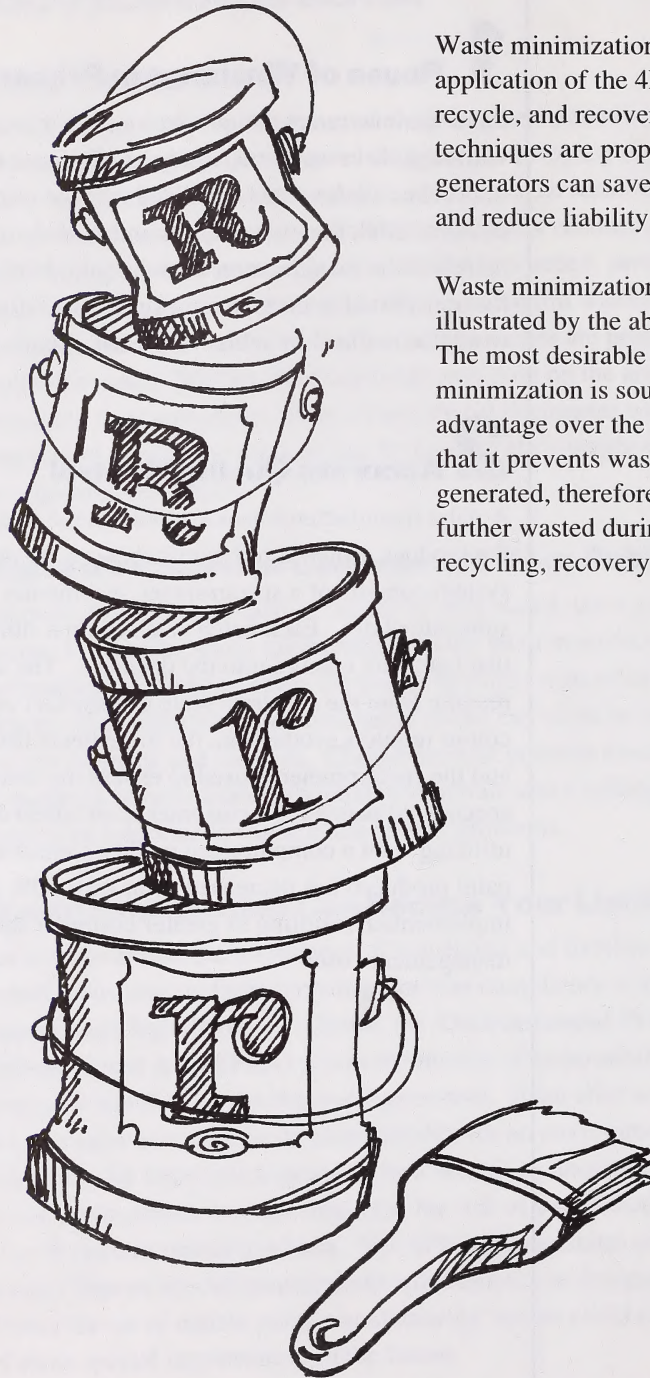
Let's not overlook the importance of legislation and liability. Many jurisdictions impose heavy penalties for non-compliance with waste management legislation. In Alberta, the **Environmental Protection and Enhancement Act (EPEA)** places the burden of responsibility for proper waste treatment and disposal on the waste generator. Even after wastes are disposed, the generator may still retain some liability for an environmental impairment caused by the improper disposal of their wastes by another company. Reduction of the waste stream can also minimize the risk of a tarnished public image due to poor environmental practices. The EPEA also contains provisions that can be used to impose special management requirements on designated materials. Minimization of certain paint manufacturing wastes could conceivably be one of these special requirements in the future.

1 Reuse of Washings in Primer Product

Paint manufacturers that produce a primer product have an added advantage with regards to waste management. Because the colour of the primer is not important, wash wastes are added into the primer without having to segregate colours. Both the waste liquids and settled solids are added to the primer, therefore the manufacturer is not required to seek a method of disposal and pay for transportation costs to a recycler. An estimated 5% savings of solvent would be realized by reblending wash liquids with new product or primer.

2 Accurate Quality Control

A paint manufacturer uses a sophisticated method of ensuring quality control of the product, which significantly reduces the amount of off-spec product. The system consists of a spectrometer, a computer database and a series of small substrate plates. Each batch is tested on a substrate plate and the ingredients of that batch are entered into the database. The spectrometer gives an accurate reading from the substrate plate of the exact colour of the paint. When the same colour requires production, the ingredients listed on the computer are combined, and the spectrometer is used to ensure the colours are identical. Producing specialized paints for a customer is an added advantage for a manufacturer utilizing such a computerized quality control system. The amount of off-spec paint produced has decreased by at least 50% since the system has been implemented, resulting in greater customer satisfaction and reduced waste management costs.



Waste minimization involves the application of the 4Rs: reduce, reuse, recycle, and recover. If these techniques are properly applied, waste generators can save on disposal costs and reduce liability.

Waste minimization priority is illustrated by the above hierarchy. The most desirable method of waste minimization is source reduction. Its advantage over the other options is that it prevents waste from being generated, therefore, resources are not further wasted during subsequent recycling, recovery or disposal.



DEVELOPING A WASTE MINIMIZATION PROGRAM

Setting up a waste minimization program is similar to managing any other aspect of your business. It requires proper planning, organization and commitment. The following steps will help you to develop and implement your company waste minimization program.

Step 1: Build Interest

- Gain support of management and employees
- Designate a company waste coordinator
- Create your audit team

Step 2: Conduct a Waste Audit

- Determine required level of detail
- Identify process inputs
- Identify process outputs
- Identify material destinations
- Determine material balance
- Identify raw materials
- Identify waste disposal costs

Step 3: Develop a Waste Minimization Plan

- Identify alternatives
- Evaluate alternatives
- Prioritize alternatives
- Prepare recommended plan

Step 4: Implement Your Plan

- Develop implementation schedule
- Obtain approval to proceed
- Inform and train staff

Step 5: Monitor Progress

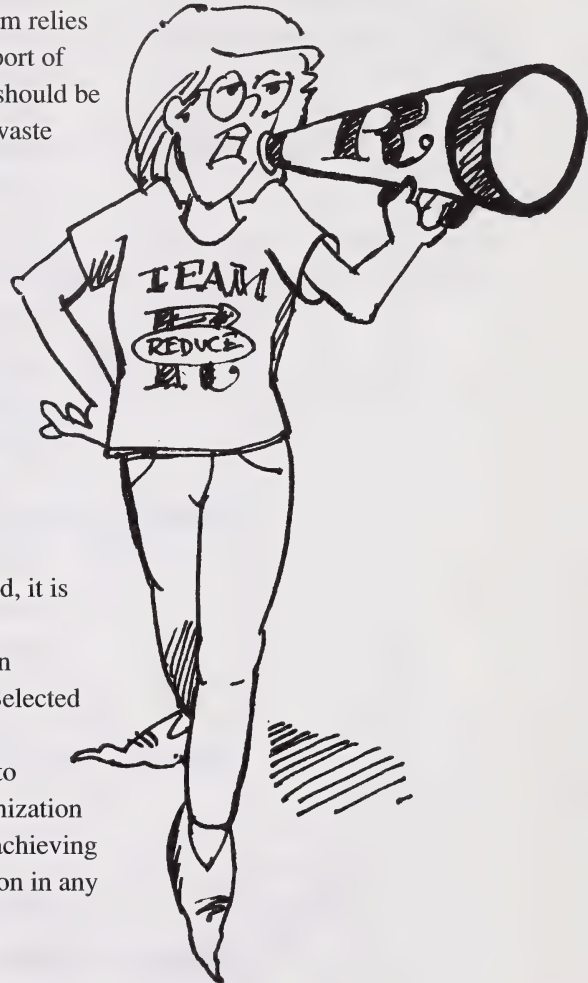
- Document waste quantities and costs
- Maintain dialogue with suppliers
- Review operations

STEP 1: Build Interest

To determine whether or not waste minimization is of interest to your company, it is helpful to review the Business Strategy Assessment found in Appendix A. The Assessment covers a wide range of business plan areas including marketing, operations, financial planning and record keeping. Upon completion of the Assessment you will have a better understanding of how waste minimization may benefit your company.

The first step in developing a waste minimization program is to build interest. Experience has shown that the success of a waste minimization program relies on the involvement and support of your employees. Everyone should be aware of the importance of waste minimization and should be encouraged to become involved. This applies to all levels of personnel including owners, managers and operations staff. Building interest and gaining support will help to increase your probability of success.

In order to get your waste minimization program started, it is often helpful to designate a company waste minimization coordinator or committee. Selected individuals should be enthusiastic and committed to implementing a waste minimization plan. Teamwork is vital to achieving successful waste minimization in any business.



STEP 2: Conduct A Waste Audit

The second step towards implementing a waste minimization program is to conduct a waste audit. This involves taking a look at the sources, types and quantities of wastes that you generate and how they are currently handled. This information will help you to evaluate waste minimization options and to set priorities for implementation of those options.

A waste audit will provide you with a snapshot of your current waste management condition. It can be a simple walk through survey of your business operations or a more detailed technical inspection of all your unit processes. It may include a records review, staff interviews, waste sampling, waste sorting and chemical analysis. You can decide what is appropriate for your business at this time.

The Waste Audit Tables found in Appendix B can be used to record the information obtained during the waste audit. For each unit process, conduct a material balance which identifies the types and quantities of process inputs and outputs, raw material costs, waste disposal costs, waste management practices and waste destinations. During the audit you should look for obvious priority wastes. Wastes that are produced in large volumes or cost you the most to dispose of usually have greater potential for waste minimization.

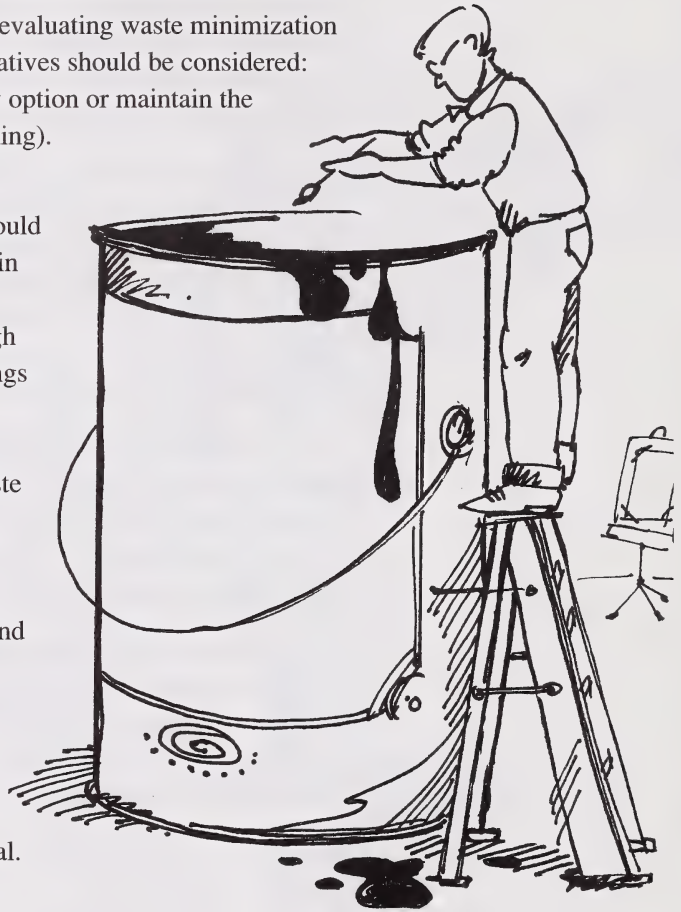
Use purchasing records to identify input materials that are expensive or are purchased in large quantities. Determine which waste outputs are produced as a result of these inputs. Use disposal records to identify costs for waste treatment, handling and disposal. Talk with your suppliers and manufacturers to determine equipment specifications and operating efficiencies.

When conducting the audit, remember that wastes can be in many different forms including solid, liquid, gaseous, vapour, heat and mixed. If you are unable to classify some waste materials or if you are unsure of the proper way to dispose of them, contact a waste management consultant or Alberta Environmental Protection.

STEP 3: Develop A Waste Minimization Plan

After conducting your waste audit you will have to identify and evaluate a number of waste minimization alternatives. The alternatives that you select will form the basis of your waste minimization program. The Waste Minimization Options section of this manual provides you with a list of alternatives applicable to the paint manufacturing industry. You will need to evaluate these options based on a set of criteria and prioritize them for implementation. Appendix C contains a set of Evaluation Forms used to assess waste minimization alternatives from both a technical and economic standpoint. When evaluating waste minimization options, two alternatives should be considered: implement the new option or maintain the status quo (do nothing).

Options to be considered first should be ones that result in significant waste reduction, have high potential cost savings and are easy to implement. Remember the waste minimization hierarchy when assessing options. Source reduction and reuse prevent the further waste of resources during subsequent recycling, recovery or disposal.



STEP 4: Implement Your Plan

Now that you have identified, evaluated and selected preferred waste minimization options, you need to develop an implementation schedule. You will need to prioritize the waste minimization options outlined in your plan. It is best to limit the number of options you initiate at a given time. Using a phased implementation schedule will allow you to monitor your progress and help to avoid making too many changes at once.

The implementation of your waste minimization program will require some changes to your daily operations. You will need to inform and train your employees on the benefits and operating procedures associated with the program. Try to maintain communication with your employees to encourage participation in your waste minimization program.



STEP 5: Monitor Progress

A complete waste minimization program involves ongoing monitoring so that its effectiveness can be determined and improvements can be made. Your program should be as dynamic as your business environment and needs to be able to adapt to changes in the marketplace, technology and the regulatory regime. You will need to track costs, savings and waste diversion quantities in order to evaluate the success of your program. This will require repeat waste audits and annual program reviews. Appendix D contains a Program Review Checklist that will help you to assess the overall performance of your waste minimization program.



In the preceding pages, you have seen how minimizing wastes can lead to greater efficiencies, lower costs and higher revenues. You have also seen how to develop an audit style approach to identifying wastes and the processes responsible for generating the wastes. After you have targeted specific waste streams to minimize, the next step is to evaluate options that will ultimately reduce the volume of wastes disposed. As you develop these options, remember to think in terms of the 4R's of waste minimization and their order of preferred application: **reduce** (at point of generation), **reuse** (for the same purpose or some other purpose), **recycle** (reprocess to re-establish usefulness), or **recover** (energy from waste, reclaim items of value, or remove hazardous components prior to disposal).

The major waste streams generated at paint manufacturing facilities include the following:

- maintenance and cleaning wastes (liquids and solids);
- spills and off-spec product;
- empty containers;
- dust collected from mixing areas;
- filter cartridges and bag filters; and
- samples, obsolete products, and customer returns.

The simplicity of the paint manufacturing process offers almost limitless opportunities to reduce the quantities of production wastes. Virtually any process liquid or solid (excluding packaging and filters) waste can be rebled and diluted in batches of new paint. However, compatibility of the ingredients in a batch mix must be carefully considered to prevent creating an off-spec product.

Based on volumes and the nature of the waste stream, the reduction of cleaning waste liquids and solids offer the best potential benefits. Although most manufacturers recycle cleaning waste water and solvents into batches of paint or primer, some of the liquid and solid wash wastes are not suitable for blending. Such wastes usually require treatment and disposal. However, through proper management, the quantities of such wastes and the associated costs of disposal can be minimized.

Empty containers and waste packaging may also pose challenges for reduction. Proper inventory management, careful purchasing practises, and innovative ideas for alternative uses of such items may yield economic benefits in terms of reduced disposal costs and efficient use of materials. The following table summarizes various 4R waste minimization options for paint manufacturing.

Paint Manufacturing Waste Minimization Options

Waste Minimized	Minimization Option	Comments
REDUCE		
All Waste Streams	Segregate wastes according to characteristics and most practical waste management methods.	<ul style="list-style-type: none"> Establish simple, easy to follow segregation system to minimize labour requirements.
	Implement an inventory control system to prevent unnecessary purchases and the potential for obsolete and shelf-life expired products.	<ul style="list-style-type: none"> Inventory control should address product types, identify nonhazardous substitute products, product shelf-life and date of product acquisition.
	Assign responsibility for waste management budgets to department(s) that generate(s) the waste.	<ul style="list-style-type: none"> Set goals to maintain or reduce waste management costs. Offer incentives to meet budget goals.
Off-Spec Product	Implement quality control systems.	<ul style="list-style-type: none"> Properly managed quality control program will aid in reducing off-spec production and improve efficiency of operations.
Volatile Organic Compounds (VOCs)	Install airtight covers on mixing vessels or minimize exposed surface area.	<ul style="list-style-type: none"> Due to the design of some mixing vessels this may be an impractical option.
	Install floating lids on solvent storage containers.	<ul style="list-style-type: none"> Minimizing headspace in a storage container will reduce the volume of VOCs escaping to the atmosphere.
	Keep all solvent containers and drums sealed at all times.	<ul style="list-style-type: none"> Train employees to keep drums sealed except when in use.
	Substitute with non-VOC cleaning solvents where practical.	<ul style="list-style-type: none"> Suggested alternate solvents could be based on terpene, dibasic esters (DBE), n-methyl 2-pyrrolidine (NMP) and dimethyl sulfoxide (DMSO).
Washwater, Washsolvent and Washsolids	Schedule long production runs of one colour.	<ul style="list-style-type: none"> Thorough cleaning between batches will be avoided.

Paint Manufacturing Waste Minimization Options

Waste Minimized	Minimization Option	Comments
REDUCE (Cont'd)		
Washwater, Washsolvent and Washsolids (Cont'd)	Schedule production runs from light colours to dark colours.	<ul style="list-style-type: none"> • Cleaning would be required only when a lighter colour is needed.
	Install high pressure, low volume spray nozzles.	<ul style="list-style-type: none"> • High velocity water streams effectively scrub waste particles. • Wash liquid consumption can decrease by up to 80 or 90 percent.
	Line mixing vessels with non-stick surfaces.	<ul style="list-style-type: none"> • Waste clingage will be reduced as well as the amount of wash liquids.
	Install mechanical scrapers or rubber wipers in mixing vessels.	<ul style="list-style-type: none"> • Automated cleaning is more desirable than manual systems. • May not be practical for small facilities.
	Utilize counter-current wash and rinse systems.	<ul style="list-style-type: none"> • Consider a two cycle cleaning process using reused “dirty” solution and reused “clean” solution followed by a final rinse with virgin wash liquids.
	Allow sufficient settling time for washwater clarification.	<ul style="list-style-type: none"> • Flocculants and de-emulsifiers may be added to expedite settling, however, caution is required as they may leave the solids unfit for recycling.
	Consider producing base products that can be tinted by the end user.	<ul style="list-style-type: none"> • Wash wastes would be reduced as fewer washings would be required. • This would require training the end user to tint products to the proper specification. • Under proper management, this approach should also generate less post-consumer waste. • Returned product could be re-sold with a different tinting kit.

Paint Manufacturing Waste Minimization Options

Waste Minimized	Minimization Option	Comments
REDUCE (Cont'd)		
Raw Material Packaging	Consider the use of removable liners in product packaging.	<ul style="list-style-type: none"> Some raw materials could be shipped in larger containers with a liner. This may not be practical for some manufacturers, and cause a material handling problem.
	Purchase powders in water soluble containers.	<ul style="list-style-type: none"> Using soluble pigment containers may be impractical for certain coatings, especially smooth finish coatings. Ingredients of the packaging may affect product quality.
	Purchase materials in bulk, rather than drums.	<ul style="list-style-type: none"> Solvent and resins stored in bulk can then be pumped or drained by gravity directly to the mixing vessel. Drum handling concerns and evaporative losses decrease substantially.
	Compact non-recyclable and non-reusable containers.	<ul style="list-style-type: none"> Compacting wastes such as empty containers will save on disposal charges and space in the landfill.
Dust	Purchase powders in a paste form to eliminate dust.	<ul style="list-style-type: none"> A potential added cost of the paste may make this option economically impractical.
REUSE		
Filters	Use reusable wire mesh screens.	<ul style="list-style-type: none"> Since re-usable filters must be cleaned, consider a waste minimization strategy for the filter cleaning wastes.
Raw Material Packaging	Advertise and obtain used pallets.	<ul style="list-style-type: none"> Pallets can be traded using the Alberta Waste Materials Exchange.
	Establish container cleaning contracts where practical.	<ul style="list-style-type: none"> Drum and pail reconditioning services are available for relatively clean containers in Alberta's major centres.

Paint Manufacturing Waste Minimization Options

Waste Minimized	Minimization Option	Comments
REUSE (Cont'd)		
Raw Material Packaging (cont'd)	Obtain materials in returnable containers.	<ul style="list-style-type: none"> • Disposal or recycling charges are recovered when containers can be returned to the raw material supplier. • Due to long travel distances from some suppliers, this may not be practical for all types or raw materials.
RECYCLE		
Raw Material Packaging (cont'd)	Consign paper bags to a paper recycler.	<ul style="list-style-type: none"> • Paper bags that contained white non-toxic powders are recyclable.
	Consign shrink wrap to a recycler.	<ul style="list-style-type: none"> • Shrink wrap from receiving raw materials on pallets may be recyclable.
	Consign waste metal cans and pails to a metal recycler.	<ul style="list-style-type: none"> • Metal recyclers will accept empty, clean cans for salvage.
Rags	Consider a rag cleaning service.	<ul style="list-style-type: none"> • Rag services will clean and recycle rags, as opposed to landfill disposal after one use. • Consider separating oil-based contaminated rags from water-based contaminated rags for easier cleaning.
Off-spec Product	Blend off-spec products and old samples with new product.	<ul style="list-style-type: none"> • Off-spec products and old product samples may be rebled with a similar product or used as a component for primer.
Old Product	Accept returnable, unused product for rebleding (or resale).	<ul style="list-style-type: none"> • Unused product can often be rebled into new production runs or sold as is.

Paint Manufacturing Waste Minimization Options

Waste Minimized	Minimization Option	Comments
RECYCLE (Cont'd)		
Washwater, Washsolvent and Washsolids	Segregate white and tinted washings and reblend into product of similar colour.	<ul style="list-style-type: none"> • Reblend the tinted wash liquids with similar colour production runs. • White wash liquids can be reblended with almost any colour production run.
	Recycle washings as a component for a primer product.	<ul style="list-style-type: none"> • Wash wastes can be added to the primer without having to segregate colours. • Costs of disposal and transportation are saved as a result.
	Purchase reconditioned solvents for cleaning purposes and return to supplier for reconditioning.	<ul style="list-style-type: none"> • Use if a process does not permit the reblending of washsolvent into product. • Using reconditioned solvent is a viable alternative which saves disposal charges.
RECOVER		
Volatile Organic Compounds (VOCs)	Install VOC recovery units on ventilation units.	<ul style="list-style-type: none"> • Collected solvents can either be recycled off site or returned to the process. • Recovery units include conservation vents, refrigerated condensers, lean-oil or activated carbon absorbers and vapour compressors.
Raw Material Packaging	Repair broken pallets or offer to employees and public as firewood.	<ul style="list-style-type: none"> • Repairing pallets or offering pallets for personal use will save on disposal charges and space at landfills.
Filters	Collect bag filters from alkyd productions and use as alternative fuel in cement kilns.	<ul style="list-style-type: none"> • A waste contractor may use these to recover the energy from residual solids.
Dust	Install a dust collection system in ventilation systems.	<ul style="list-style-type: none"> • Reduces dust releases to atmosphere. • Dust collected may be reblended into a primer product.

Recycling Markets

Many wastes that are produced in the paint manufacturing industry are recyclable. However, whether a company will accept the material for recycling depends on market economics, product quality, and product quantity. Information on material markets must be continually updated as recycling companies are very dynamic. The province has established a recycle information line to address the dynamic nature of the recycling industry. Information on current recycling markets and company contacts can be reached by calling Alberta's Recycle Info Line at 1-800-463-6326.

Daily Operations, New Products and New Equipment

In order to stay on top of new advances in the paint industry, you will need to focus on improving your access to information. This can be accomplished by joining industry associations, subscribing to trade journals, and scanning electronic information sources such as the Internet.



Paint manufacturers, like all generators of waste, must adhere to municipal, provincial and federal legislation. The table shown below identifies the relevant purpose of each major piece of environmental legislation that applies to the paint manufacturing industry.

Legislation

Relevant Purpose

Municipal

Sewer Use Bylaws

To regulate the release of chemicals into the municipal sewer system.

Solid Waste Bylaws

To regulate the storage, collection, and disposal of solid waste.

Provincial

Alberta Environmental Protection and Enhancement Act (EPEA)

To regulate the classification, handling, and disposal of waste.

To regulate the management and disposal of municipal waste.

Occupational Health and Safety Act

To regulate worker safety and exposure to chemicals.

Transportation of Dangerous Goods Control ACT (TDGCA)

To regulate the packaging, handling, documentation, labelling, and tracking of dangerous goods during transport.

Federal

Canadian Environmental Protection Act (CEPA)

To regulate the international importation and export of hazardous wastes.

Transportation of Dangerous Goods Act (TDGA)

To regulate the trans-border shipment of dangerous goods and hazardous wastes.

Fisheries Act

To protect the environmental quality of waters that are frequented by fish.

This section provides you with useful telephone contacts to help you manage your wastes more effectively. A detailed list of recycling companies is not included in this list as information changes quite rapidly. However, the agencies listed below maintain current databases of the active companies and their services.

Waste Minimization and Recycling

Alberta's Recycle Info Line: 1-800-463-6326

Alberta Environmental Protection, Waste Minimization Branch: (403) 427-5838
or call your local Government of Alberta rite operator and ask for 427-5838

Alberta Waste Materials Exchange: (403) 450-5050

Recycling Council of Alberta: (403) 287-1477

City of Edmonton Waste Hotline: (403) 496-5678

City of Calgary Recycling Hotline: (403) 277-7770

or

check your local recycle hotline or municipal public works department

Waste Classification and Hazardous Waste Management

Alberta Environmental Protection, Industrial Wastewater Branch:
(403) 422-4192 or call your local Government of Alberta rite operator and ask
for 422-4192

Environmental Services Association of Alberta: 1-800-661-9278

Paint Manufacturing Organizations

Canadian Paint and Coatings Association: (514) 745-2611

National Paint and Coatings Association: (202) 332-3194

BUSINESS STRATEGY ASSESSMENT FOR WASTE MINIMIZATION

Instructions: Check the appropriate answer for each question.

YES means your business plans are promoting or could promote waste minimization.

NO means your plans are not encouraging waste minimization.

REQUIRES FURTHER ANALYSIS means you need to further evaluate your plan in that area.

	Yes	No	Requires Further Analysis
1. Do you and your employees recognize the importance of waste minimization and proper management of hazardous materials?			
2. Do your marketing strategies incorporate the positive public image related to waste minimization?			
3. Do you publicize your company's efforts to reduce waste?			
4. Are workers and management developing a program to promote waste minimization in your company?			
5. Have you looked at your procedures to promote source reduction?			
6. Are you recycling every waste that you can?			
7. Do you know the quantity of waste (liquid, solid, gaseous and heat) produced by each process in your business?			
8. Do you keep your facility clean and orderly to enable you to keep track of chemical handling and process operations?			

APPENDIX A

**BUSINESS STRATEGY
ASSESSMENT FOR
WASTE MINIMIZATION**

- 9. Do you segregate process waste streams?
- 10. Do your workers know which processes produce wastes?
- 11. Does your operations plan include periodic waste reduction audits?
- 12. Do you use Material Safety Data Sheets (MSDSs) to evaluate raw materials prior to purchase to ensure you are using the least toxic materials wherever possible?
- 13. Do you limit your inventory stock to prevent possible spills, avoid overpurchasing and other waste?
- 14. Do you request information regarding the types and quantities of waste generated by equipment you plan to purchase?
- 15. Do your purchasing agreements include provisions for inspecting shipments prior to acceptance to ensure they are not leaking or damaged?
- 16. Do your purchasing agreements include provisions for the return of excess materials and wastes?
- 17. Do you attempt to exchange those wastes that can't be reduced with other companies?
- 18. Are your storage areas designed to control spills and improve safety?
- 19. Do you have an emergency response plan?

Yes	No	Requires Further Analysis

APPENDIX A

**BUSINESS STRATEGY
ASSESSMENT FOR
WASTE MINIMIZATION**

- 20. Are all of your workers trained in emergency response procedures?
- 21. Does your company policy promote employee training and development in the area of waste minimization?
- 22. Do you consider the cost of waste disposal when developing profit and loss statements?
- 23. Do you know the waste production costs associated with the various processes in your business?
- 24. Do you keep records on the amount of raw materials used per process to monitor process efficiency?
- 25. Do you maintain logs on the types and quantities of waste produced by your company so that you can target certain waste streams for waste minimization opportunities?
- 26. Do you maintain MSDSs on the materials used in your company to help you identify possible waste streams for minimization?
- 27. Do you keep written policies to document standard facility operation procedures?

Yes	No	Requires Further Analysis

PAINT INDUSTRY WASTE AUDIT TABLE

Manufacturer Location _____

Solvent/LateX/Both _____

Contact Phone Number _____

Major Raw Materials _____

Date of Waste Audit _____

Number of Employees _____

Peak Season _____

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Corrugated Cardboard			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Dust			Air Filter			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

APPENDIX B

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Fibre Drums			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Filters			Product Filtering			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Off-Spec Product			Quality Control			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Office Paper			Office Operations			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

APPENDIX B

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Pallets			Shipping, Raw Material and Product			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Paper Bags			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Plastic Bags			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Plastic Bottles			Tint Blend Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

APPENDIX B

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Plastic Drums			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Plastic Pails			Raw Material / Product Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Plastic Wrap			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Product Samples, Tinted			Sampling, Lab Work			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

APPENDIX B

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Product Samples, White			Sampling, Lab Work			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Rags			Maintenance			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Steel Cans, 1L, 4L, 20L			Raw Material / Product Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Steel Drums			Raw Material Packaging			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

APPENDIX B

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Towels, Paper			Lunchroom, Washroom			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Wash Solids – Oil Based			Equipment Washing			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Wash Solids – Water Based			Equipment Washing			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Washsolvent, Tinted			Equipment Washing			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

APPENDIX B

Waste Stream	Comments	Haz. Waste?	Origin	Quantity	Costs	Treatment/Disposal Method
Washsolvent, White			Equipment Washing			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Washwater, Tinted			Equipment Washing			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...
Washwater, White			Equipment Washing			<input type="checkbox"/> Landfill <input type="checkbox"/> Solidification <input type="checkbox"/> Recycle Offsite <input type="checkbox"/> Recycle Onsite <input type="checkbox"/> Return to Source <input type="checkbox"/> Reused <input type="checkbox"/> Clarification/Coagulation <input type="checkbox"/> Sanitary Sewer <input type="checkbox"/> Other ...

WASTE MINIMIZATION OPTION EVALUATION FORMS

Economic Evaluation Form

Instructions: Check the appropriate answer for each question. Skip over questions that do not apply. Copy this form so that you have one form for each option you are evaluating.

Waste Minimization Option: _____

	Yes	No	Requires Further Analysis
1. Is this option within your budget (consider both capital and operating costs)?			
2. Does this option have an acceptable payback period?			
3. Will this option reduce your raw material costs?			
4. Will this option reduce your utilities costs?			
5. Will this option reduce the costs associated with worker injury or illness?			
6. Will this option reduce your liability/ insurance premiums?			
7. Will this option reduce your waste disposal costs?			
8. Will this option increase your annual sales?			
9. Will this option improve your product marketability?			

Technical Evaluation Form

Instructions: Check the appropriate answer for each question. Skip over questions that do not apply. Copy this form so that you have one form for each option you are evaluating.

Waste Minimization Option: _____

	Yes	No	Requires Further Analysis
1. Does this option have a proven track record?			
2. Will this option maintain product quality?			
3. Will this option maintain or improve productivity?			
4. Can this option be easily implemented without additional staff?			
5. Will this option create less waste?			
6. Is your facility layout and design capable of incorporating this option?			
7. Will the supplier guarantee this option?			
8. Will this option maintain or improve worker health and safety?			
9. Will this option improve your regulatory compliance?			
10. Does this option reduce wastes at their source?			
11. Can this option be easily serviced?			
12. Are other businesses successfully using this option?			

WASTE MINIMIZATION PROGRAM REVIEW CHECKLIST

Date: _____ Date of Last Audit: _____

Person Completing Checklist: _____

Instructions: Check the appropriate answer for each question. Copy this checklist so that you can compare it with future annual evaluations.

1. Have you implemented all of the options identified in your waste minimization plan? YES NO
Describe: _____
2. Does waste minimization remain a priority for management and operations personnel? YES NO
Describe: _____
3. Have your waste minimization efforts reduced costs through:
 - Reduction of raw material costs YES (estimate \$ _____) NO
 - Savings on effluent management equipment YES (estimate \$ _____) NO
 - Reduced disposal costs YES (estimate \$ _____) NO
 - Improved health and safety YES (estimate \$ _____) NO
 - Other YES (estimate \$ _____) NO
4. How effective have your efforts been at reducing the following types of wastes:

Waste Type	Amount Reduced Per Year
Air emissions	
Hazardous wastes	
Heat or energy losses	
Maintenance and clean-up waste	
Obsolete or out-dated stock	
Solid waste	
Spills and container leaks	
Spoiled production runs	
System leaks (pipes, joints, etc.)	
Chemical effluent	
Wastewater	
Other:	

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